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empowered to make arrangements with superior officers and employers for collecting the premiums amongst those employed by them, so it should constitute all savings banks, but especially Friendly Societies, its agents.

No risk whatever would be incurred by Government, for the friendly societies would have to account weekly or monthly for the monies received, and the assured might be supplied with their receipts for the premiums paid direct from the Head Office. In this manner the greatest opponents to the Government scheme would become its warmest supporters, and our legislators, instead of administering a death blow to those ancient institutions, that are so entirely in harmony with the spirit of the nation, would preserve and render them a lasting service by freeing them of their greatest element of insecurity. I venture to think that by this step, more than by any other, the benevolent intentions of the promoters of the Government Assurance Bill will be most successfully realized.

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*On the Rates of Mortality and Marriage amongst Europeans in India.* By SAMUEL BROWN, F.S.S.

[Read before the British Association, Section (F), at Bath, September, 1864.]

IN a paper which I had the honour of reading before the Institute of Actuaries in December, 1862, an inquiry was made into the rates of mortality and marriage amongst Europeans in India, but was principally confined to the experience amongst military officers, as recorded in the books of the Madras Military Fund, and compared with the records of similar funds in the other Presidencies. The data—which I was favoured with an opportunity of collecting during an elaborate investigation into the position and prospects of the fund—extended over the long period of fifty years, from 1808 to 1857, and related to more than 5,000 officers who had entered the fund in that period, and had either died, or withdrawn, or were living at the close of the observations, on the 1st January, 1858. The subdivision of the facts into two periods, of those who entered from 1808 to 1822, and from 1822 to 1857, showed a very marked diminution at every quinquennial period of age in the rate of mortality up to the age of 50, after which, in the latter period, the numbers were not sufficient fairly to carry on the comparison. On the average of all ages the rate in the former period was 3·92 per cent., and in the latter 2·69

per cent., though allowance must be made for the fact that some of the latter had not attained such advanced ages.

Another conclusion, clearly arrived at, was, that at all ages below 65 the mortality amongst married officers, was considerably less than amongst bachelors, being seldom more than 60 or 70 per cent. of the latter. The average rate of mortality at all ages was amongst bachelors 3.44 per cent., married officers 2.83 per cent., and widowers 4.45 per cent.

Amongst retired officers the rate of mortality in each class, whether bachelors, married men, or widowers, was found to be always highest at the younger ages, and to diminish with great regularity to the ages 55 to 60. After this age it seems to exceed generally, by about 25 per cent., the rate of mortality by Dr. Farr's healthy life table for males.

In regard to the marriage-rates, the observations were minute enough to afford some interesting deductions. A paper then recently read by Mr. Archibald Day, before the Institute of Actuaries, "On the Statistics of Marriages amongst the Families of the Peerage," extending for a period of 100 years preceding 31st December, 1855, and comprising the marriages amongst 2,721 bachelors, enabled me to make comparisons with those amongst military officers in the Madras army.

The marriages amongst the aristocracy, as compared with the general population, were observed to take place at a much later period of life, and still more so amongst widowers. This peculiarity was even more strongly observable amongst bachelors, being military officers in India, and to a certain extent amongst the widowers, the rates of marriage of the latter between 50 and 55 being double that of the peerage. It should be noticed that this period of life is nearly approaching that which shows the maximum rate of retirement, and may perhaps be connected in some way with the return of officers to Europe. Of officers in India, the average rate of marriage at all ages was 3.75 per cent. amongst the bachelors, and 9.25 per cent. amongst widowers, whilst in the peerage of Great Britain the rates were respectively 3.63 per cent. and 5.55 per cent.

In my former paper a table was also given, showing amongst 1,526 first marriages, 164 second, 17 third, and one fourth marriage, the number which were contracted amongst officers of the Madras army, at each quinquennial age of the husband with wives of the same or any other quinquennium of age, from which the conclusion was clearly drawn, that as the husband married later in life, the greater was the discrepancy of age between himself and his wife.

The average age at which bachelors marry appear to be about 30, and of their wives 23, a difference of about seven years. Under 20, the bachelors marry wives about three years younger than themselves, and from 20, the discrepancy in favour of a younger wife steadily increases each five years, till at 60-65 years of age for the husbands, it is twenty-five years younger for the wife. For widowers, the average age of marriage appears to be about 41, and their wives 27, a difference of fourteen years—just double that of bachelors. Under 25, in widowers' marriages, the average age of the wife is five years older than her husband, but afterwards the discrepancy of age in favour of a young wife increases till it is much higher than that of bachelors, being from 30 to 34 years when widowers marry at 60 and upwards.

Since the publication of that paper, the interest in the subject has by no means diminished. The vast impulse given to the commercial undertakings of India, railways, telegraph, and financial, land and trading companies, must have led to a great increase in the European population, an increase which, there is every reason to believe, will become annually greater as European skill and capital find profitable employment in those wide fields of enterprise. At the same time it will be many years before a proper organization can be given to the collection of the statistics of life and health amongst a population so scattered or migratory as this is likely to be. Young men, sent out as engineers for commercial, telegraph, and other companies, will, in most cases, have to proceed to new and unsettled districts, and frequently move about from one station to another. It would be well if all public companies, as well as the Government services, were to keep a careful register of their employés, their ages at admission, date of withdrawal or death, and, as far as possible, of their marriages, families, &c. In the meantime the most precise information on these subjects at present available will be found in the records of the annuity, provident, and pension funds for widows and children, which have been for many years established in the different Presidencies, both for the military and civil services of the Government. They require for their own purposes that the date of the birth, marriage, withdrawal, or death of each member should be furnished, as well as the date of birth of his wife, and of her second marriage or death, and of the births or death of all his children. If these registers had been as carefully kept from the beginning as they are at present, there would have accumulated by this time the materials for working out several important problems in population statistics. It is desirable, at any rate, to gather to-

gether what has hitherto been made public, for comparison with more complete data which may be given hereafter.

It was from the records of these funds that the facts stated in my former paper were drawn relative to the rates of mortality and marriage amongst military officers in India, and I propose now to extend the inquiry to European civilians resident there.

The most important sources of original facts, in reference to the mortality and marriage amongst European civilians in India, will be found in the following reports, with some incidental notices in the publications which were enumerated in my former paper :—

- In 1836 (20th February), Mr. Griffith Davies' "Report on the Bombay Civil Fund."
- In 1842, Mr. Davies, for the Bengal Uncovenanted Civil Service Pension Fund, deduced a table of mortality from the Bengal Civil Service.
- In 1850, "Report of the Committee on the Bengal Civil Service Fund."
- In 1850, Mr. Davies' "Report on the Madras Civil Fund."
- In 1851, Mr. Davies' "Report on the Bengal Civil Fund."
- In 1852, Mr. Neison's "Report on the Bengal Civil Fund."
- In 1852, Mr. Neison's "Report on the Madras Civil Fund."
- In 1855, Mr. Neison's "Report on the Madras Civil Fund" (in which he introduces the mortality according to years of service).
- In 1861 (26th June), Mr. W. Grant's "Report on the Subsidiary Branch of the Madras Civil Fund."
- In 1861 (18th November), his "Report on the Charity Branch of the above Fund."
- In 1861 (24th June), Mr. Neison's "Report on the Bombay Civil Provident Fund."

In addition to the above, the following reports on the medical funds contain much interesting matter :—

- Madras Medical Fund, Mr. Neison's Reports, 16th February and 29th May, 1856.
- Bombay Medical Fund, Mr. G. Davies' Report, 15th February, 1847.
- Bombay Medical Fund, Mr. Neison's Reports, 2nd January, 1854, and 7th November, 1855.

*Bengal Civilians.*

In Mr. Davies' "Report on the Bengal Civil Fund," in June, 1851, he states that not having the means of forming mortality tables from their own experience, he had been obliged to examine the other Indian reports for original data to guide him. In 1842 he had formed for the Bengal Uncovenanted Service Family Pension Fund, a table of mortality amongst the Bengal Civil Service, from the lists of Dodwell and Miles. Such table gave the mortality below the age of 40, somewhat lower than the Northampton Table, and higher afterwards. But on examining Mr. Neison's table for the Bengal Military Fund, and considering that soon after the age of 40 the members of the Civil Service Fund begin to return to this country, he had determined to adopt the Northampton Table from the age of 40 and upwards, and continue it below that age by his own table from the Bengal Civil Service, above alluded to.

Mr. Neison, in his report of 14th December, 1852, following this, still regrets that he has not the actual experience of the Fund to refer to, but objects to the lists of Dodwell and Miles, which he considers worthless for the purpose of deducing the rates of mortality amongst the servants of the Company, since they were not compiled with this object in view, and can only be regarded as ordinary directories. Major Hannyngton, however, had pointed out a most important document, and one more trustworthy for the purpose. It is a "Register of the Honourable East India Company's Civil Servants of the Bengal Establishment, from 1790 to 1842, &c., compiled under the direction of the Honourable H. T. Prinsep, late Member of the Council of India, by Ramchunder Doss."

The rate of mortality for each quinquennial period of age, as given by the compiler in the introduction, and also the rates from an adjusted table deduced by Major Hannyngton, are as follow:—

| Ages. | Exposed to Risk. | Died. | Rate per Cent. | Adjusted by Major Hannington. Rate per Cent. |
|-------|------------------|-------|----------------|--|
| 20    | 231              | 8     | 3.47           | 2.55   |
| 21-25 | 4,782            | 93    | 1.95           | 1.98   |
| 26-30 | 4,010            | 84    | 2.09           | 1.83   |
| 31-35 | 3,177            | 48    | 1.51           | 2.04   |
| 36-40 | 2,172            | 60    | 2.76           | 2.45   |
| 41-45 | 1,496            | 44    | 2.94           | 3.09   |
| 46-50 | 818              | 29    | 3.55           | 3.82   |
| 51-55 | 392              | 23    | 5.87           | 4.55   |
| 56-60 | 152              | 5     | 3.30           | 5.31   |
| 61-65 | 57               | 3     | 5.26           | 6.20   |
| 66-70 | 14               | 1     | 7.20           | 7.47   |
| 71-75 | 2                | ..    | ..             | 9.15   |
| 76-80 | ..               | ..    | ..             | 11.63  |
| 81-85 | ..               | ..    | ..             | 17.86  |
| 86-90 | ..               | ..    | ..             | 24.83  |
| 91-95 | ..               | ..    | ..             | 37.93  |
| 96    | ..               | ..    | ..             | 100.   |
|       | 17,302           | 398   | 2.30           | 3.38   |

But it had been clearly shown by the records of the military funds that the rate of mortality in India had diminished of late years, and, as the above table did not afford the means of a similar comparison, Mr. Neison recomputed the rates according to different decennial periods after the members' arrival from Europe. It is probable, however, that by this minute subdivision, the facts at some of the ages are too few to admit of averages for a fair comparison, and it will be quite sufficient to give Mr. Neison's rates for the two periods 1790-1819 and 1820-42:—

*Bengal Civil Service—Members Arriving in India in the Years*

| Ages. | 1790-1819.       |       |                     | 1820-42.         |       |                     |
|-------|------------------|-------|---------------------|------------------|-------|---------------------|
|       | Exposed to Risk. | Died. | Mortality per Cent. | Exposed to Risk. | Died. | Mortality per Cent. |
| 21-25 | 2,898            | 51    | 1.76                | 2,006            | 41    | 2.04                |
| 26-30 | 2,550            | 50    | 1.96                | 1,528            | 30    | 1.96                |
| 31-35 | 2,248            | 40    | 1.78                | 975              | 10    | 1.03                |
| 36-40 | 1,937            | 48    | 2.48                | 285              | 4     | 1.40                |
|       | 9,633            | 189   | 1.96                | 4,794            | 85    | 1.77                |

At the younger ages it would appear that the rate has somewhat increased, or remained the stationary, but at quinquennial ages above

30, the diminution in mortality is considerable, which Mr. Neison accounts for by supposing that persons of the most experience will be the first to take advantage of the precautions suggested as best calculated to preserve health. These observations, however, relate only to the members of the civil service, whilst actually employed in India. A very important question arises as to the rate of mortality amongst the members after retirement. Without the actual experience of the fund, which he thinks would be in this case so valuable, Mr. Neison argues, from the official documents to which he had access in the India House, relating to the retired officers of the Bengal Military Service, that the rate of mortality amongst them does not differ widely from that of the general population of England and Wales at corresponding ages; and further, that the rates of mortality amongst retired members, both of the civil and military services, are almost identical. He therefore constructed a new table for the valuation of the fund. Admitting that Mr. Davies' table, up to the age of 40, agreed very nearly with the ratio of deaths pointed out by the preceding facts, he had taken the same rates up to that age, but continued the table from the age of 45 by his own table, given in his report on the Bengal Military Fund in 1849; and between the ages 39 and 45, the terms were interpolated. The effect of this is to show at ages above 40, a considerable improvement in the duration of Indian lives, in fact to approximate after that period to the general rate of mortality in this country.

In the course of an investigation now proceeding into the Bengal Civil Fund, I have been favoured by the secretary not only with a table which enables me to bring down the observations of the Bengal Civil Service to a very recent date, but with the means of collecting the experience of the fund itself for the thirteen years 1850 to 1862 inclusive. These data are important, as they show the mortality of the members in each class, bachelors, married men, and widowers, as well as the mortality amongst females and children, and the rate of marriage amongst both sexes. The experience of the Bengal Civil Service has been divided into two periods, 1800 to 1830, and 1831 to 1858, showing at the middle ages, 20 to 40, a considerable diminution in the rate of mortality in the latter period.

The number who entered in the former period was 647, of these 283 died, 238 became annuitants, 60 withdrew, and 66 were living to 1859. The number exposed to risk was 13,887, and the rate of mortality 2.04 per cent. In the latter period 568 entered, of whom 96 died, 4 became annuitants, 26 withdrew, and 442

were living to 1859; the number exposed to risk was 5,631, and the rate of mortality 1.70 per cent.

The following table shows the rate of mortality at the quinquennial ages in the two periods referred to, and in the whole period 1801 to 1858 inclusive, compared also with Davies' table used in 1850 (which Mr. Neison also followed up to age 40), with Neison's table for the Bengal army, 1800 to 1847, and with Farr's healthy life table for males. The total rates per cent. also are given for the Bengal Civil Fund, thirteen years' experience, terminating 1st January, 1863, but the numbers are scarcely sufficient to divide the latter into the three classes, bachelors, married men, and widowers, except by grouping periods of 10 years of age together. The column for the Madras Civil Service, 1760 to 1853, is added from the comprehensive "Report on the Sanitary State of the Army in India," in which Dr. Farr has brought together such varied information from every available source.

*Rates of Mortality per Cent.*

| Ages.              | BENGAL CIVIL SERVICE. |          |                      |   | BENGAL CIVIL FUND.            |  | G. Davies.<br>Used<br>in 1850. | Neison.<br>Bengal<br>Army.<br>1800-47. | Madras<br>Civil<br>Service,<br>1760<br>to<br>1853. | Farr's<br>Healthy<br>Life<br>Males. |
|--------------------|-----------------------|----------|----------------------|---|-------------------------------|--|--------------------------------|--|--|-------------------------------------|
|                    | 1801-30.              | 1831-58. | Retired,<br>1801-58. | Active<br>and<br>Retired.<br>Total,<br>1801-58. | Thirteen<br>Years<br>to 1863. | Of whom<br>were<br>Killed in<br>the<br>Mutiny. |                                |  |  |                                     |
| 14-                | 2.19                  | 2.44     | ..                   | 2.24  | ..                            | ..   | ..                             | 1.19                                   | ..   | .72                                 |
| 20-                | 1.78                  | 1.48     | ..                   | 1.65  | 1.07                          | .41  | 1.41                           | 2.19                                   | 1.40   | .92                                 |
| 25-                | 2.20                  | 1.73     | ..                   | 2.02  | 1.80                          | .64  | 1.59                           | 2.34                                   | 1.52   | .99                                 |
| 30-                | 1.57                  | 1.24     | ..                   | 1.47  | 1.51                          | .44  | 1.77                           | 2.62                                   | 1.55   | .96                                 |
| 35-                | 2.00                  | 2.81     | 8.00                 | 2.19  | 1.88                          | .55  | 1.94                           | 2.63                                   | 1.63   | 1.24                                |
| 40-                | 2.02                  | 3.01     | 1.08                 | 2.08  | 1.08                          | .32  | 2.24                           | 2.55                                   | 1.79   | 1.21                                |
| 45-                | 2.19                  | ..       | 1.14                 | 1.76  | 2.16                          | .23  | 2.52                           | 2.92                                   | 2.04   | 1.70                                |
| 50-                | 4.29                  | ..       | 1.81                 | 2.54  | 2.46                          | .16  | 3.04                           | 2.23                                   | 2.52   | 1.85                                |
| 55-                | 3.77                  | ..       | 2.55                 | 2.71  | 2.07                          | ..   | 3.59                           | 2.54                                   | 2.84   | 2.86                                |
| 60-                | 18.18                 | ..       | 3.70                 | 4.26  | 4.26                          | ..   | 4.32                           | 3.03                                   | 2.97   | 3.40                                |
| 65-                | ..                    | ..       | 6.25                 | 6.22  | 7.79                          | ..   | 5.43                           | 1.52                                   | 3.57   | 5.71                                |
| 70-                | ..                    | ..       | 6.34                 | 6.34  | ..                            | ..   | 7.46                           | ..                                     | 5.05   | 7.34                                |
| 75-                | ..                    | ..       | 20.93                | 20.93   | 14.29                         | ..   | 10.81                          | ..                                     | 8.50   | 12.59                               |
| 80-                | ..                    | ..       | ..                   | ..  | 100-                          | ..   | ..                             | ..                                     | ..   | ..                                  |
|                    | 2.04                  | 1.70     | 3.05                 | 2.10  | 1.76                          | .41  | ..                             | 2.28                                   | ..   |                                     |
| Exposed<br>to Risk | 13887                 | 5,631    | 3248                 | 22,766  | 7625.5                        | ..   | ..                             | 88,630                                 |  |                                     |
| Died               | 283                   | 96       | 99                   | 478   | 134                           | 31   | ..                             | 2,019                                  |  |                                     |

The records of the Bengal Civil Fund show the number of members killed in the mutiny, and the mortality is considerably

altered thereby, the large proportion of 31 out of 184 deaths being due to this cause, and principally affecting the ages 25 to 30, at which ages they amounted to nearly one-third of the total deaths; being all on active service, the ages above 55 remain unaltered.

From the thirteen years experience of the Bengal Civil Service Fund, I was enabled to trace the rates of mortality and marriage amongst bachelors and widowers, or of mortality and the chances of becoming widowers amongst married men at each age. The inquiry is too minute to be pursued here, but the summary may be given.

Of bachelors 213 were living on 1st January, 1850, and 386 entered since. Of these 14 were killed in the mutiny, 31 died, 23 withdrew, 245 married, 42 retired, and 244 were living on 1st January, 1863. The number exposed to risk was 2,919, of whom 1.54 per cent. died, including .48 per cent. who were killed in the mutiny, and 8.39 (a very large proportion) married.

Of married men, 249 were living 1st January, 1850, of whom 29 were married to second wives; since then, 245 bachelors married, and 6 entered the fund as married men, 18 entered into a second marriage, and 1 for the third time. Of the total number 519, 60 died (of whom 15 were killed in the mutiny), 9 withdrew, 47 became widowers, 120 retired, and 283 were living 1st January, 1863. The number exposed to the risk was 3539.5, and the rate of mortality was 1.69 per cent., including .42 per cent. killed.

Of widowers, 24 were living 1st January, 1850, and 47 became widowers since, of whom 9 died (2 of them being killed), 27 remarried (of whom 1 married for the third time), 14 retired, and 21 were living 1st January, 1863. The number exposed to risk was 274.5, and the rate of mortality was 3.28 per cent. (of whom .73 per cent. were killed in the mutiny).

These facts all relate to service in India. The retired members might be traced in the same way under each class.

#### *Marriage Rate.*

The rates per cent. of marriage at each quinquennial age, both amongst bachelors and widowers, are very irregular, but they seem in nearly all cases to be unusually high. It would be well to continue the observations a few years longer. In the following table I have compared together the rates in the Bengal Civil Fund, in the Madras Military Fund, as given in my former paper, in the peerage of Great Britain, and in the general population of England and Wales, as shown in the Registrar-General's reports.

### *Rates per Cent. of Marriage.*

From 244 cases in which the ages both of husband and wife were given, it may be concluded that the average age of a bachelor member of the fund on marrying is 28, and of his wife about 22; the difference is six years, and the age at marriage is a little below the age at which the bachelor members of the Madras Military Fund marry, which appears to be 30, and the wife 23, a difference of age of seven years.

In the following table is shown, for bachelors who marry at any quinquennial period of age, the number of wives at each quinquennial group of ages, whether older or younger than the husband.

*Bengal Civil Fund. Bachelors Married in Thirteen Years, 1850-62 inclusive.*

| Age of Husband. | AGE OF WIFE. |     |     |     |        | Total. | PER CENT. OF TOTAL MARRIAGES, AGE OF WIFE. |      |      |     |        | Total. |
|-----------------|--------------|-----|-----|-----|--------|--------|--|------|------|-----|--------|--------|
|                 | 17-          | 20- | 25- | 30- | 35-40. |        | 17-  | 20-  | 25-  | 30- | 35-40. |        |
| 20-             | 26           | 53  | 7   | 1   | ..     | 87     | 10·6                                       | 21·7 | 2·9  | ·4  | ..     | 35·7   |
| 25-             | 18           | 47  | 11  | 2   | ..     | 78     | 7·4  | 19·3 | 4·5  | ·8  | ..     | 32·0   |
| 30-             | 12           | 25  | 6   | 5   | 3      | 51     | 5·0  | 10·2 | 2·5  | 2·1 | 1·2    | 20·9   |
| 35-             | 2            | 6   | 5   | ..  | ..     | 13     | ·8   | 2·5  | 2·1  | ..  | ..     | 5·3    |
| 40-             | 3            | ..  | 2   | 1   | ..     | 6      | 1·2  | ..   | ·8   | ·4  | ..     | 2·5    |
| 45-             | ..           | ..  | 2   | 3   | 1      | 6      | ..   | ..   | ·8   | 1·2 | ·4     | 2·4    |
| 50-             | ..           | 1   | ..  | 1   | ..     | 2      | ..   | ·4   | ..   | ·4  | ..     | ·8     |
| 55              | 1            | ..  | ..  | ..  | ..     | 1      | ·4   | ..   | ..   | ..  | ..     | ·4     |
|                 | 62           | 132 | 33  | 13  | 4      | 244    | 25·4                                       | 54·1 | 13·6 | 5·3 | 1·6    | 100·   |

*Bombay Civilians.*

The first report of Mr. Davies on the Bombay Civil Service Fund is dated as far back as 20th February, 1836. He collected the experience of the fund for 29 years, from its commencement to May, 1833, on the assumption that all the members were 20 years of age on their arrival in India, and then compared the results with Mr. Prinsep's table of the Bengal Civil Service from 1790 to 1831, as given in the first volume of the "Journal of the Asiatic Society." His own facts are but few in number, but they show a remarkable uniformity at all ages under 50, fluctuating between 2·35 and 2·60 per cent., and at the younger ages considerably exceeding the rates of mortality in Bengal. The following is the summary:—

*Experience of the Bombay Civil Fund, Twenty-Nine Years, to 183 .*

| Ages. | Exposed to Risk. | Died. | Mortality per Cent. |
|-------|------------------|-------|---------------------|
| 20-   | 954              | 25    | 2·60                |
| 25-   | 724              | 17    | 2·35                |
| 30-   | 570              | 15    | 2·63                |
| 35-   | 410              | 10    | 2·44                |
| 40-   | 294              | 7     | 2·38                |
| 45-   | 193              | 5     | 2·59                |
| 50-   | 110              | 5     | 4·57                |
| 55-   | 23               | 1     | 4·26                |
| 60-62 | 8                | 1     | 12·50               |
|       | 3,287            | 86    | 2·62                |

From a paper which was furnished by two of the East India Directors, Messrs. Ravenshaw and Loch, comprising a summary of the years 1805 to 1822, for the civil services in Bengal, Madras, and Bombay, it appeared that there were, on an average of each year, 431 living in Bengal, 226 in Madras, and 103 in Bombay, and the rates per cent. of deaths during the period were respectively 2·34, 2·30, and 3·08 per cent.

The experience of the Bombay Civil Fund bore out the observation generally made, that married life is subject to less mortality than single life, the rate of the former being only 2·51 per cent., compared with 2·62 per cent., above given.

As to retired members, he proposed to recommend the use of the Northampton Table at advanced ages, as allowing for the deterioration of health in Indian lives; though the experience of the fund really showed only 9 deaths above 47, whilst 10 $\frac{1}{2}$  might have been expected by the use of that table. The table he used for the valuation, was constructed from the actual experience before 47, and from that age continued by the Northampton Table. By this table for a constant community of 170 persons living, at ages 20 to 45, 9·20 would have to be sent out annually, 4·86 would retire, and 4·34 would die.

Mr. Neison, in his report on this fund, 24th June, 1861, after referring to his other reports for information on the rate of mortality amongst European lives in India, copies word for word his own observations, tables, and comparisons in his report on the Bengal Civil Service Fund in 1852, and finally adopts the same table as he there gives, both for the active and retired services, starting only with the number 79,792, instead of 100,000, as living at 20.

It does not appear, therefore, that we have any original data from the experience of the Bombay Civil Fund since the small table furnished by Mr. Davies in 1836.

*Madras Civilians.*

In the first report of Mr. Davies, dated 9th March, 1850, on the Madras Civil Fund, he seems to have been unable to obtain the ages of the retired members or of their wives, or the numbers and ages of their children. He appears to have used the tables in his report of the Madras Military Fund for the valuation of the pensions, till death or marriage of the widows and daughters; and the single life table for females; and the joint life table for husband and wife, from the tables of the Bombay Civil Fund, in his report of 1836. No original data are here obtained.

Following this was Mr. Neison's report, dated 27th December, 1852, in which he repeats word for word his remarks on mortality which appear in his report for the Bengal Civil Service, dated a few days earlier, namely, on the 14th December in the same year. He, in conclusion, uses the same table both for active and retired service which we have before described, going back, however, to the basis of 100,000 as entering at age 20, and on which his subsequent monetary tables are computed.

But a subsequent report, bearing date the 20th July, 1855, furnishes some original data which are worth examining, relating to the mortality which was observed according to years of service, having the opportunity to compare with them a similar return which I have drawn up from the records of the Bengal Civil Service, from 1790 to 1842, amongst the members who were on service in India.

In the Bengal Civil Service the average age of arrival in India on the whole period, 1790 to 1842, was about  $18\frac{1}{2}$ ; but since 1820, it appears to have increased, and latterly may be taken as nearer age 20. By assuming the latter age for the commencement of observation, the rate of mortality in the annexed table will be found to correspond very nearly with the table under ages compiled under Mr. Prinsep's instructions, but after the first fifteen years is much higher than the rates observed in the most recent data from 1801 to 1858. There are scarcely any retirements under 25 years' service, then they increase rapidly up to 40-45, when they are upwards of 11 per cent. per annum, and the mortality diminishes in proportion.

In Mr. Neison's facts from the Madras Civil Fund, it will be

noticed, from the very long periods of service of some of the members, that those who have retired up to 1st January, 1854, are included under observation. The mortality, therefore, should only be compared for the first 25 years of service, and it will be found generally in Madras to be about 70 per cent. of that in Bengal.

| Years<br>of<br>Service. | BENGAL CIVIL SERVICE, 1790-1842. |                 |           |          | MADRAS CIVIL FUND,<br>1792-1854. |                    |
|-------------------------|----------------------------------|-----------------|-----------|----------|----------------------------------|--------------------|
|                         | Exposed<br>to<br>Risk.           | Rates per Cent. |           |          | Exposed<br>to<br>Risk.           | Per Cent.<br>Died. |
|                         |                                  | Died.           | Resigned. | Retired. |                                  |                    |
| 0-                      | 4,110                            | 2.16            | .51       | ..       | 3320.                            | 1.39               |
| 5-                      | 4,178                            | 2.08            | .79       | ..       | 2863.5                           | 1.64               |
| 10-                     | 3,366                            | 1.37            | .59       | ..       | 2444.                            | 1.31               |
| 15-                     | 2,338                            | 2.61            | .98       | .04      | 2052.                            | 1.85               |
| 20-                     | 1,628                            | 2.95            | 1.90      | .06      | 1675.5                           | 1.91               |
| 25-                     | 944                              | 3.49            | .95       | 5.82     | 1326.5                           | 1.81               |
| 30-                     | 464                              | 4.31            | 1.51      | 7.54     | 1069.                            | 2.53               |
| 35-                     | 183                              | 5.46            | ..        | 10.38    | 836.                             | 2.75               |
| 40-                     | 72                               | 2.78            | 2.78      | 11.12    | 613.5                            | 3.26               |
| 45-                     | 18                               | 11.11           | ..        | ..       | 425.                             | 2.59               |
| 50-                     | 4                                | ..              | ..        | ..       | 285.5                            | 4.55               |
| 55-                     | ..                               | ..              | ..        | ..       | 150.5                            | 8.64               |
| 60-                     | ..                               | ..              | ..        | ..       | 39.5                             | 17.72              |
| 65-                     | ..                               | ..              | ..        | ..       | 7.                               | 14.29              |
| 70-75                   | ..                               | ..              | ..        | ..       | 1.                               | 100.               |
|                         | 17,305                           | 2.30            | .84       | .69      | 17108.5                          | 1.96               |
| Total number            | ..                               | 398             | 146       | 119      | ..                               | 335                |

In reference to the mortality amongst civilians in India, the general conclusions at which we arrive, are—

1. That a considerable diminution has taken place of late years in the mortality at the middle ages, 20 to 35, and at all ages, if we compare it with the earlier observations of the present century.
2. That a very marked distinction may be observed in favour of married life.
3. That as compared with Farr's English healthy life table, the difference varies from  $\frac{1}{2}$  to 1 per cent. higher between the ages 20 and 55, after which it fluctuates, but is generally scarcely higher than the English rates.

In reference to the rate of marriage—

1. That the rate of marriage amongst bachelors is much higher at every age than in the peerage of Great Britain, and though at

ages under 30, it may be about 25 per cent. less than that of the general population, yet at all other ages it is considerably more.

2. That marriages take place at a much earlier period than in the military service, and on the average of all ages under 40, the rate is nearly double.

3. The same remark applies to widowers, whose marriage-rate under the age of 45 is considerably higher amongst the civil than the military service, though not more than 70 per cent. of that of the general population of England and Wales.

I trust that the few statistics here recorded may lead to a more careful collection in the books of the Indian Annuity and Pension Funds, from which so much information on the families of members can be readily obtained. They may throw light not merely on the relative mortality of India and this country—both subjects at the present time of the highest interest—but to the elucidation of many novel questions, which an accurate register of family statistics could not fail to afford us.

This subject may be further illustrated by some facts which have been collected recently in an interesting paper read before the Statistical Society by Mr. P. M. Tait, and published in the *Statistical Journal*. The Eurasians, as the name indicates, are a mixed race, the descendants of European (originally to a great extent Portuguese) and Asiatic parents. Latterly, the British is the predominant European element; but the name appears applied indiscriminately to the children of other colonists—Jews, Syrians, Christian Arabs, Armenians, Persians, Affghans, Danes at Serampore, Chinese and Americans. They are looked upon with some prejudice by the natives, being described as having the vices of the natives and Europeans, without the probity of the latter; but they are much employed in the inferior Government offices, and some Indian officers under whom they have served bear witness to their quickness at computation, intelligence, probity and unquestioned loyalty. They form a large proportion of the members of the Uncovenanted Service Pension Fund. Out of 945 who entered in 20 years ending 30th April, 1857, there were 693 of this class or 73 per cent., 244 Europeans or 26 per cent., and the remaining 8, or about 1 per cent., were undescribed. The dates of birth, entry, death, or withdrawal, were all verified for the 20 years; and comparing the results of the whole Fund, of the Eurasians only, and of the Bengal Civil Service from 1801 to 1858, which we have already examined, the following short table comprises the principal facts:—

| Ages. | UNCOVENANTED SERVICE PENSION FUND, 20 YEARS TO 30TH APRIL, 1857. |       |                |                  |       |                | Bengal Civil Service, 1801 to 1857 inclusive. Mortality per Cent. |  |
|-------|--|-------|----------------|------------------|-------|----------------|---|--|
|       | Total Members.   |       |                | Eurasians only.  |       |                |   |  |
|       | Exposed to Risk.   | Died. | Rate per Cent. | Exposed to Risk. | Died. | Rate per Cent. |   |  |
| 21-25 | 186  | ..    | ..             | 173·5            | ..    | ..             | 1·65  |  |
| 26-30 | 747  | 12    | 1·61           | 624              | 7     | 1·12           | 2·02  |  |
| 31-35 | 1275·5   | 17    | 1·33           | 1019             | 13    | 1·28           | 1·47  |  |
| 36-40 | 1329·5   | 25    | 1·88           | 1023·5           | 19    | 1·86           | 2·16  |  |
| 41-45 | 998·5  | 35    | 3·51           | 749              | 28    | 3·74           | 2·12  |  |
| 46-50 | 683  | 19    | 2·78           | 448·5            | 11    | 2·45           | 2·14  |  |
| 51-55 | 421  | 24    | 5·71           | 283·5            | 16    | 5·64           | 4·29  |  |
| 56-60 | 238·5  | 7     | 2·94           | 147·5            | 4     | 2·71           | 3·77  |  |
| 61-65 | 115·5  | 15    | 12·99          | 76               | 9     | 11·84          | 18·18   |  |
| 66-70 | 52·5   | 5     | 9·52           | 33·5             | 4     | 11·94          | 66·67   |  |
| 71-75 | 9  | 3     | 33·33          | 3                | 2     | 66·67          | ..  |  |
| 76-79 | 4  | 1     | 25·            | ..               | ..    | ..             | ..  |  |
|       | 6060·0   | 163   | 2·69           | 4581             | 113   | 2·47           | 1·94  |  |

Hitherto the mortality of Eurasians has been thought to be considerably greater than that of Europeans, and some Assurance Companies declined them at European rates of premium; but at ages under 40 it seems that about 1·35 Eurasians die per cent., and 1·76 of European civilians. At older ages the reverse is shown, as above. It is probable, however, that with the recent improvement in European life in India, the difference would be found scarcely perceptible, even at the younger and most exposed ages.

If space permitted me to make a full comparison with the mortality of natives of India—soldiers and civilians—we should have to consult the admirable reports with which Colonel Sykes has from time to time for more than twenty years enriched the pages of the *Statistical Journal*.

I could not, however, conclude this part of the subject without a brief allusion to the recent and very elaborate "Report of the Commissioners appointed to inquire into the Sanitary State of the Army in India," in which our distinguished President of this Section, Dr. Farr, took so conspicuous a part. The fullest evidence was taken upon every subject that affects the health or mortality of the Indian army, the causes of the excess of the death-rate amongst Europeans as compared with natives, and the remedies suggested for the almost entire disappearance of such excess. The recommendations will be principally effective in bettering the condition of the common soldier; but some of them, such as the selection of hill stations, the improvement of barracks, &c., would no doubt

TABLE A (Bengal Civil Service).—*Experience of Mortality in the 58 Years, 1801 to 1858 inclusive, in Quinquennial Periods of Age.*

| Ages. | ACTIVE SERVICE. |        |       |                        |           |                 | RETIRED ANNUITANTS. |        |       |                 |          |                 |
|-------|-----------------|--------|-------|------------------------|-----------|-----------------|---------------------|--------|-------|-----------------|----------|-----------------|
|       | Entered.        | Lived. | Died. | Retired as Annuitants. | Withdrew. | Living to 1859. | Entered.            | Lived. | Died. | Living to 1859. | Entered. | Living to 1859. |
|       | (1)             | (2)    | (3)   | (4)                    | (5)       | (6)             | (7)                 | (8)    | (9)   | (10)            | (11)     | (12)            |
| 14-   | 760             | 1,285  | 20    | ..                     | 3         | ..              | 883·5               | ..     | ..    | ..              | ..       | (5)             |
| 20-   | 454             | 5,233  | 81    | ..                     | 18        | 119             | 4897·               | ..     | ..    | ..              | ..       | ..              |
| 25-   | 1               | 4,417  | 87    | ..                     | 27        | 100             | 4309·5              | ..     | ..    | ..              | ..       | ..              |
| 30-   | ..              | 3,490  | 50    | 1                      | 14        | 99              | 3408·               | 1      | 2     | ..              | ..       | 1·5             |
| 35-   | ..              | 2,666  | 56    | 5                      | 11        | 71              | 2594·5              | 5      | 16    | 1               | 1        | 12·5            |
| 40-   | ..              | 2,054  | 42    | 62                     | 10        | 36              | 1979·               | 64     | 126   | 1               | 1        | 93·             |
| 45-   | ..              | 1,076  | 21    | 112                    | 2         | 56              | 980·5               | 126    | 694   | 7               | 29       | 613·            |
| 50-   | ..              | 365    | 14    | 42                     | 1         | 20              | 326·5               | 53     | 831   | 14              | 45       | 775·            |
| 55-   | ..              | 117    | 4     | 12                     | ..        | 6               | 106·                | 23     | 744   | 18              | 33       | 707·            |
| 60-   | ..              | 28     | 4     | 7                      | ..        | 1               | 22·                 | 9      | 568   | 20              | 25       | 541·            |
| 65-   | ..              | 2      | ..    | 1                      | ..        | ..              | 1·5                 | 3      | 346   | 20              | 29       | 320·            |
| 70-   | ..              | ..     | ..    | ..                     | ..        | ..              | ..                  | 3      | 156   | 9               | 16       | 142·            |
| 75-80 | ..              | ..     | ..    | ..                     | ..        | ..              | ..                  | ..     | 52    | 9               | 9        | 43·             |
|       | 1,215           | 20,733 | 379   | 242                    | 86        | 508             | 19518·              | 287    | 3,535 | 99              | 188      | 3248·           |

TABLE B (Bengal Civil Fund).—*Experience for 13 Years, 1850 to 1862 inclusive, amongst Members who were either Bachelors, Married Men, or Widowers, on 1st Jan., 1850, or who entered either of those Classes since. (Active and Retired combined.)*

| Ages. | BACHELORS. |        |       |            | MARRIED MEN. |        |       |            | WIDOWERS. |        |       |            | Living, 1 Jan., 1863. |     |
|-------|------------|--------|-------|------------|--------------|--------|-------|------------|-----------|--------|-------|------------|-----------------------|-----|
|       | Entered.   | Lived. | Died. | With-drew. | Entered.     | Lived. | Died. | With-drew. | Entered.  | Lived. | Died. | With-drew. | Re-married.           |     |
| (1)   | (2)        | (3)    | (4)   | (5)        | (6)          | (1)    | (2)   | (3)        | (4)       | (5)    | (6)   | (1)        | (2)                   | (3) |
| 19—   | 471        | 1,354  | 5     | 87         | 1            | 102    | 201   | 1          | 1         | 3      | 19    | 3          | 5                     | (4) |
| 25—   | 59         | 1,049  | 7     | 14         | 12           | 84     | 106   | 133        | 645       | 3      | 57    | 13         | 36                    | (5) |
| 30—   | 11         | 407    | 1     | 2          | 3            | 51     | 88    | 87         | 791       | 4      | 8     | 7          | 55                    | (6) |
| 35—   | 25         | 208    | ...   | 1          | 1            | 14     | 21    | 78         | 715       | 4      | 10    | 2          | 14                    | (1) |
| 40—   | 22         | 226    | ...   | 2          | 5            | 6      | 19    | 75         | 715       | 2      | 4     | 1          | 4                     | (2) |
| 45—   | 7          | 191    | 3     | 10         | 6            | 6      | 8     | 29         | 747       | 2      | 13    | 5          | 5                     | (3) |
| 50—   | 2          | 96     | 1     | 3          | 3            | 3      | 2     | 14         | 505       | 11     | 1     | 3          | 66                    | (4) |
| 55—   | 1          | 18     | ...   | 1          | 12           | 7      | 204   | ...        | 4         | 1      | 2     | 29         | 2                     | (5) |
| 60—   | ...        | 5      | ...   | ...        | ...          | 3      | 2     | ...        | ...       | 2      | ...   | 16         | 2                     | (6) |
| 65—   | ...        | 2      | ...   | 1          | ...          | ...    | 2     | ...        | ...       | 2      | ...   | 3          | ...                   | (1) |
| 70—   | 1          | 4      | ...   | 1          | ...          | ...    | ...   | ...        | ...       | 17     | ...   | 2          | 7                     | (2) |
| 75—   | ...        | 5      | ...   | 1          | ...          | ...    | ...   | ...        | ...       | 10     | ...   | 1          | 5                     | (3) |
| 80—   | ...        | ...    | ...   | ...        | ...          | ...    | ...   | ...        | ...       | 1      | ...   | ...        | ...                   | (4) |
| 599   | 3,565      | 14     | 35    | 39         | 251          | 260    | 529   | 4,677      | 15        | 60     | 14    | 53         | 387                   | 77  |
|       |            |        |       |            |              |        |       |            |           |        |       |            | 434                   | 2   |
|       |            |        |       |            |              |        |       |            |           |        |       |            | 8                     | 1   |
|       |            |        |       |            |              |        |       |            |           |        |       |            | 32                    | 34  |

In Table A the ages are those last birthday, but in Table B they are deduced from the year of birth to the year of event, so that the number exposed to risk would be Col. (2) —  $\frac{\text{Col. 1, 3, 4, 5}}{2}$ , and the ages observed would be  $x - \frac{1}{2}$  to  $x + \frac{1}{2}$ . The average age of retirement may be taken at about 48.

incidentally benefit the European officers also. In the report and appendix the summaries of the facts relating to Europeans in the civil or military services are compared. The general tenor of the report leads irresistibly to the conclusion that the great mortality, which formerly decimated the Indian armies, might, by judicious arrangements, be reduced to the ordinary rate amongst European civilians there; whilst the mortality amongst the latter has for many years undergone so great an improvement, as to present at some ages no very striking contrast with that of similar classes in this country; a remarkable proof that the science of statistics is not (as it used to be thought) a mere dry and tedious marshalling of figures, but an eminently practical and useful study, leading, even in the small part of its domain which we are now exploring, to suggestions which may be the means of preserving thousands of lives, and substituting the enjoyments of healthy existence for the uncontrolled ravages of disease and death.

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*A Budget of Paradoxes.* By PROFESSOR DE MORGAN.

No. XIV. 1830—1833.

(Continued from p. 232.)

*Demonville.*—A Frenchman's Christian name is his own secret, unless there be two of the surname. M. Demonville is a very good instance of the difference between a French and English discoverer. In England there is a public to listen to discoveries in mathematical subjects made without mathematics: a public which will hear, and wonder, and think it possible that the pretensions of the discoverer have some foundation. The unnoticed man may possibly be right: and the old country-town reputation which I once heard of, attaching to a man who "had written a book about the signs of the zodiac which all the philosophers in London could not answer," is fame as far it goes. Accordingly, we have plenty of discoverers, who, even in astronomy, pronounce the learned in error because of mathematics. In France, beyond the sphere of influence of the Academy of Sciences, there is no one to cast a thought upon the matter: all who take the least interest repose entire faith in the Institute. Hence the French discoverer turns all his thoughts to the Institute, and looks for his only hearing in that quarter. He therefore throws no slur upon the means of knowledge, but would say, with M. Demonville—"A l'égard de M. Poisson, j'envie loyalement la millième partie de ses connaissances mathématiques,